Annex CC
(normative)

Evaluation of integrated circuit (IC) current limiters

CC.1 Integrated circuit (IC) current limiters

IC current limiters (used for current limiting the output of a power source in accordance with the requirements of a limited power source, see 2.5) are not shorted from input to output if they comply with all of the following:

– CLEARANCES and CREEPAGE DISTANCES for REINFORCED INSULATION are provided between the input and output pins for the applicable WORKING VOLTAGE, except for IC current limiters in SELV CIRCUITS;

– the IC current limiters limit the current to the manufacturer's specified value (not to be more than 5 A) under normal operating conditions with any specified drift taken into account;

– the IC current limiters are entirely electronic and have no means for manual operation or reset;

– the IC current limiters shall limit the current to 5 A, taking into account the manufacturer's specified drift, as applicable, (an open circuit is considered an acceptable result) after each of the conditioning tests given in either of the test programs specified in CC.2, CC.3 or C.C.4. The IC current limiter need only meet one of the test programs.

NOTE The power source for the tests should be capable of delivering 250 VA minimum unless the IC current limiter is tested in the end product.

A different sample may be used for each test.

CC.2 Test program 1

Test program 1 consists of the following:

– *10 000 cycles of turning enable on and off with a 100 Ω ± 5 Ω resistor and a 425 μF ± 10 μF capacitor in parallel with the output;*

– *10 000 cycles of turning enable on and off with an ferrite-core inductor having 0,35 mH ± 0,1 mH inductance at 1 kHz and a d.c. resistance not exceeding 1 Ω connected in the output circuit;*

– *10 000 cycles of turning enable on and off with the input connected to a capacitor rated 425 μF ± 1 μF and shorting the output;*

– *10 000 cycles of turning the input pin on and off with a capacitor rated 425 μF ± 10 μF connected to the input supply while keeping enable active and shorting the output;*

– *10 000 cycles of turning the input pin on and off with an ferrite-core inductor having 0,35 mH ± 0,1 mH inductance at 1 kHz and a d.c resistance not exceeding 1 Ω connected to the input supply and return while keeping enable active and shorting the output;*

– *50 cycles with the enable pin held active with the output open-circuited, each cycle consisting of shorting the output and then opening the output;*

– *50 cycles with the enable pin held active while applying a short to the output, each cycle consisting of turning the power on and off;*

– *50 cycles with the enable pin held active while power is applied, each cycle consisting of shorting the output, removing power, reapplying power, removing the short, followed by removal of power.*

CC.3 Test program 2

Test program 2 consists of the following:

- *50 cycles with the enable pin held active with the output open-circuited; each cycle consisting of shorting the output and then opening the output;*
- *50 cycles with the enable pin held active while applying a short to the output; each cycle consisting of turning the power on and off;*
- *50 cycles with the enable pin held active with the output loaded to maximum power, each cycle consisting of turning the power on and off;*
- *50 cycles with the enable pin held active while power is applied, each cycle consisting of shorting the output, removing power, reapplying power, removing the short, followed by removal of power;*
- *3 cycles of exposing the device (not energized) to 70 °C ± 2 °C for 24 h; followed by at least 1 h at room ambient; followed by at least 3 h at -30 °C ± 2 °C; followed by 3 h at room ambient;*
- *10 cycles of exposing the device (while energized) to 50 °C ± 2 °C for 10 min; followed by 10 min at 0 °C ± 2 °C with a 5 min period of transition from one state to the other;*
- *7 days with the output short-circuited and the device wrapped in a double layer of* CHEESECLOTH. *A fast blow 5 A fuse (complying with IEC 60127-1) kept in series with the output shall not open.*

CC.4 Test program 3

Test program 3 consists of the following:

- *H.17.1.4.2 of IEC 60730-1:1999;*
- *10 000 cycles of turning enable on and off with a 100 Ω resistor and 425 μF capacitor in parallel with the output;*
- *10 000 cycles of turning enable on and off with a ferrite-core inductor having 0,35 mH ± 0,1 mH inductance at 1 kHz and a d.c. resistance not exceeding 1 Ω connected in the output circuit;*
- *10 000 cycles of turning enable on and off while input connected to a capacitor rated 425 μF and shorting the output;*
- *10 000 cycles of turning input pin on and off while a capacitor rated 425 μF to the input supply keeping enable active and shorting the output;*
- *10 000 cycles of turning input pin on and off with a ferrite-core inductor having 0,35 mH inductance at 1 kHz and a d.c. resistance not exceeding 1 Ω connected to the input supply keeping enable active and shorting the output;*
- *50 cycles with enable pin held active and applying short to output with power on and off;*
- *50 cycles with enable pin held active and output loaded to maximum power with power on and off;*
- *50 cycles with enable pin held active and applying power, apply short to output; remove power, apply power, remove short, remove power;*
- *3 cycles of exposing the device (not energised) to 70 °C for 24 h; followed by at least 1 h at room ambient; followed by at least 3 h at − 30 °C; followed by 3 h at room ambient;*
- *10 cycles of exposing the device (while energised) to 49 °C for 10 min; followed by 10 min at 0 °C with a 5 min period of transition from one state to the other.*

CC.5 Compliance

After each of the tests in CC.2, CC.3 and CC.4, the device shall limit the current in accordance with its specification as applicable or the device shall become open circuit. An open-circuited device is replaced with a new sample and tests continued as applicable.